

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Richard R. Hengst

Title: APPARATUS AND METHOD OF MAKING A SLIP
FREE WAFER BOAT

App. No.: 09/884,720

Filed: June 19, 2001

Examiner: Ram N. Kackar

Group Art Unit: 1763

Customer No.: 34456

Confirmation No.: 2520

Atty. Dkt. No.: 1035-E3978

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MS Non-Fee Amendment
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

REQUEST FOR RECONSIDERATION

Dear Sir:

In response to the Office Action mailed February 6, 2004, reconsideration and withdrawal of the rejections contained therein are respectfully requested for the following reasons:

1. Claims 1-6, 11-15, 29-30 and 32 were rejected under §103 over Hengst or Inaba et al in view of Lu et al. These rejections are respectfully traversed for the following reasons:

The claimed invention (Claim 1) is directed to a wafer boat for supporting silicon wafers having a particular combination of features, namely a ceramic coating having an impurity migration-preventing thickness greater than or equal to 30 microns and a surface finish that prevents frictional slip in the silicon wafers, the surface finish being less than or substantially equal to 1.0 microns. This particular combination of features, minimum thickness and maximum surface finish, is responsible for improved performance and market success, discussed in more detail below.

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<u>Laura H. Andre</u> Typed or Printed Name	<u>[Signature]</u> Signature

It appears that the PTO has relied upon either of the primary references, Hengst or Inaba et al., for disclosure of basic structural features of the claimed invention, and has acknowledged that the primary references fail to disclose or even remotely suggest the recited minimum thickness of 30 microns. In an attempt to meet this feature, the PTO has relied upon Lu et al. However, Applicant respectfully submits that the PTO's reliance upon Lu et al. is misplaced.

Particularly, while the disclosures of the primary references are directed to silicon carbide wafer boats having CVD-SiC coatings, the disclosure of Lu et al. is directed to an entirely different technology, namely silicon carbide components utilized in single-wafer etching chambers for semiconductor processing. These components take on the configuration of a chambered dome and/or wall, and are used in relatively aggressive chemical etching environments. As described in column 5, lines 55-59 and lines 63-65, Lu et al. disclose that the CVD-SiC coating is provided to overlie a sintered silicon carbide main body portion to provide (i) additional resistance to etching, and (ii) resistance to formation of particulates that can contaminate semiconductor processing during this etching process. Further, Lu et al. disclose that the silicon carbide coating advantageously has a higher electrical conductivity than that of the main body portion, enabling grounding of the component during semiconductor processing. As should be clear, such disclosure is distinguished from wafer boats of the primary references, which are not a component utilized in single-wafer etching processes. Rather, such wafer boats are deployed in batch (multiple wafer) processing to carry out thermal treatment such as rapid thermal annealing and high temperature thermal oxidation operations. The materials and processing considerations associated with batch processing with wafer boats are entirely distinct from those of etching operations according to the disclosure of Lu et al. Absent Applicant's own disclosure, one ordinary skill in the art would not have looked to the CVD coating of Lu et al. for thickness of CVD Coatings on wafer boats. There is nothing to suggest that the particular design criteria associated with etching apparatuses, such as etch resistance or electrical conductivity, have any relevance to wafer boats. Reliance upon Lu et al. can only come from Applicant's own disclosure, which is clearly inappropriate. Accordingly, the rejections over the primary reference in view of Lu et al. are deficient and should be withdrawn on this basis alone.

Furthermore, the particular disclosure of Lu et al. relied upon by the PTO (column 6, lines 21-24) is misplaced. Lu et al. merely makes reference to protective silicon carbide coatings

that are known to have thicknesses less than 100 microns, and makes such reference in the context of CVD-SiC coatings outside the context of semiconductor fabrication equipment. See column 6, lines 14-16. Again, there is absolutely no disclosure supporting why one of ordinary skill in the art would have relied upon such a maximum thickness limitation of 100 microns in the context of the wafer boats of Hengst or Inaba et al.

Furthermore, the references of record nowhere disclose or even remotely suggest the particular significance associated with the combination of minimum thickness of 30 microns and the maximum surface finish of 1.0 microns. This combination of features is particularly important according to the claimed invention, and provides for exemplary resistance to impurity migration from the bulk of the wafer boat, and reduction in frictional slip in the wafers during processing. This relative significance is nowhere more clear than the commercial success associated with embodiments of the claimed invention, which commercial success is directly related to and has a close nexus with the claimed combination of thickness and surface finish features.

More particularly, as described in the Declaration filed October 17, 2003, the assignee of the present application introduced 300 mm wafer boats incorporating all features of the claimed invention (claim 1), notably including the combination of thickness and surface finish features. While those 300 mm wafer boats also incorporated additional structural features described in the Declaration as "enhanced geometric features," it was found that those features were only marginally commercially successful. That is, those enhanced geometric features were introduced by the assignee without the claimed combination of thickness and surface finish features according to the claimed invention. That prior introduction of product only provided a marginal improvement in commercial activity, and failed to penetrate relatively difficult markets including the French, Taiwanese, and Japanese markets.

In contrast, the wafer boats introduced incorporating the additional thickness and surface finish combination of features proved surprisingly commercially successful. This success is illustrated by the premium selling price associated with the 300 mm wafer boats, more than 100% greater (i.e., 2.4 times greater) than the average selling price of the 300 mm wafer boats of the competition. Moreover, commercial success was illustrated by newly found penetration into

the French, Taiwanese, and Japanese markets. Such notable commercial success is due to improved performance including reduction in frictional slip combined with impurity migration resistance, enabled by the combination of thickness and surface finish features according to the claimed invention Applicant submits that widespread acceptance of this price premium and increased market penetration are directly associated with and the result of the combination of minimum thickness and surface finish features according to the claimed invention, and that this attendant commercial success unequivocally demonstrates the non-obviousness of the claimed invention.

For at least the foregoing reasons, applicants submit that the presently claimed invention would not have been obvious over the primary references in view of Lu et al. Accordingly, reconsideration and withdrawal of the §103 rejections are respectfully requested.

2. The PTO's additional reliance upon Wingo to reject dependent Claim 16 fails to make up for any of the deficiencies of the combination of references discussed above. Accordingly, withdrawal of this rejection is respectfully requested as well.

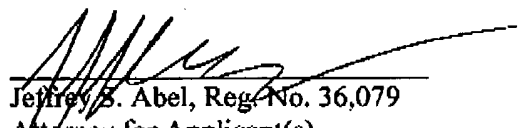
Applicant respectfully submits that the present application continues to be in condition for allowance. Accordingly, the Examiner is requested to issue a Notice of Allowance for all pending claims. Should the Examiner deem that any further action by the Applicant would be desirable for placing this application in even better condition for issue, the Examiner is requested to telephone Applicant's undersigned representative at the number listed below.

Applicant does not believe that any additional fees are due, but if the Commissioner believes additional fees are due, the Commissioner is hereby authorized to charge any fees that may be required, or credit any overpayment, to Deposit Account Number 50-2469.

Respectfully submitted,

Date

5/6/04


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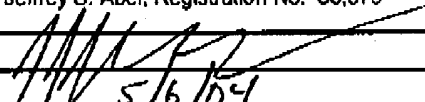
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TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	09/884,720	
	Filing Date	June 19, 2001	
	First Named Inventor	Richard R. Hengst	
	Art Unit	1763	
	Examiner Name	Ram N. Kackar	
Total Number of Pages in This Submission	6	Attorney Docket Number	1035-E3978

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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT		
Firm or Individual name	Jeffrey S. Abel, Registration No. 36,079	
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Signature		Date 5/6/04

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DATE: May 6, 2004

TO: Examiner Ram N. Kackar
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FAX NO.: 703-872-9306

FROM: Jeffrey S. Abel
Reg. No.: 36,079

RE U.S. App. No.: 09/884,720, filed June 19, 2001

Applicant(s): Richard R. Hengst

Atty Dkt No.: 1035-E3978

Title: APPARATUS AND METHOD OF MAKING A
SLIP FREE WAFER BOAT

NO. OF PAGES (including Cover Sheet): 7

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Attached please find:

- ☒ Transmittal Form (1 pg)
- ☒ Request for Reconsideration (5 pgs)

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